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Optimization of TIG Welding Process Parameters for X70-304LDissimilar Joint Using Taguchi Method

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Abstract: The optimization of mechanical properties of the welded joints requires a statisticalapproach such as Taguchi experimental designs associated with experimental techniques andlaboratory characterizations. The aim of this work is to propose a method of optimization of themechanical performances of a TIG dissimilar welding of two grades of steels: a high strength lowalloy steel X70 and an austenitic stainless steel 304L. The experimental designs were chosenaccording to the Taguchi method L9. The metallurgical characterization includes opticalmicroscopy, SEM microscopy, EDX analyses and mechanical tests to establish a relationshipbetween welding parameters, microstructures and mechanical behavior in different dissimilar weldregions. The results showed that the hardness is more strongly related to microstructural evolutionthan tensile strength of dissimilar joint. It was found that gas flow is the main significant TIGwelding parameter affecting dissimilar weld characteristics.

Keywords : hardness, tensile test, ANOVA, Dissimilar welds, Taguchi method